

App. No. 10/806,727

Reply to Office action of June 23, 2004

REMARKS/ARGUMENTSA. Summary of the Amendment

This is a full and timely response to the non-final Office Action dated June 23, 2004. Reexamination and reconsideration are courteously requested. By way of the present amendment, claims 1, 10, 13, 20, and 23 are amended. No claims are added or canceled, and no claims have been withdrawn as the result of an earlier restriction requirement. Thus, claims 1 to 23 remain pending for the Examiner's consideration, with claims 1, 13, and 23 being independent claims.

B. Allowable Subject Matter

Although the office action does not indicate that any claims are allowable, independent claim 23 is not rejected under either 35 U.S.C. § 102 or § 103. During a telephone interview with the examiner on September 15, 2004, the examiner clarified that claim 23 would be allowed if the below-described rejection under 35 U.S.C. § 112, second paragraph is overcome. Applicants thank the Examiner for a thorough examination of the claims.

C. Rejections under 35 U.S.C. § 112, Second Paragraph

Claims 10, 20, and 23 are rejected as being indefinite due to a typographical error that recites a hot isostatic pressing step performed at temperatures ranging up to 23000 degrees F. The typographical error is corrected by way of the present amendment, and the rejected claims now recite an upper temperature of 2300 degrees F instead of 23000 degrees F. Consequently, it is respectfully requested that these rejections be withdrawn.

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D. Rejections Under 35 U.S.C. § 102

Claims 1 to 3 are rejected as being anticipated by U.S. Patent No. 6,491,208 ("James"). These rejections are respectfully traversed. Although James discloses a cold spraying process on a gas turbine engine component, James fails to teach or suggest that any post processing is performed on the turbine engine component after the cold spraying process is completed. The examiner asserts that cold spraying a second layer of powder material over a first layer could be considered a post-spray process with respect to the first layer. Although it is counter intuitive that cold spraying would be considered a post-spray process, claim 1 is currently amended to clarify that any post spray processing on the turbine component is performed while heating the turbine component above a cold gas-dynamic spraying temperature, thereby eliminating any cold gas-dynamic spraying step from possible interpretations of what a post-spray process encompasses. It is therefore respectfully requested that these rejections be withdrawn.

E. Rejections Under 35 U.S.C. § 103(a)

Claims 4 to 6 are rejected as being unpatentable over James. Claims 4 to 6 depend from claim 1. In view of the present amendment to claim 1 and the above comments regarding James, it is respectfully submitted that these rejections are overcome.

Claims 1 to 22 are rejected as being unpatentable over James in view of U.S. Patent No. 6,049,978 ("Arnold"). These rejections are respectfully traversed. Remarks regarding the features in each of the independent claims are separately provided below, followed by remarks regarding features from the dependent claims.

i) Claim 1

As previously discussed, claim 1 recites the step of:

post-spray processing the turbine component while heating the turbine component above a cold gas-dynamic spraying temperature to consolidate

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applied material and restore metallurgical integrity to the repaired turbine component.

The post-spray processing encompasses several high temperature treatments such as vacuum sintering, hot isostatic pressing, and one or more thermal treatments. Although thermal spraying and other high temperature coating processes have incorporated some or all of these high temperature treatments after application of the coatings, these high temperature post-spray treatments have not previously been introduced to cold gas dynamic spraying technology.

James exemplifies the prior understanding by those skilled in the art that high temperature treatments would not be necessary following a cold gas-dynamic spraying. Although James discloses cold gas-dynamic spraying generally, there is no teaching or suggestion of any need for high temperature treatments after cold gas-dynamic spraying is complete. Unlike thermal spraying treatments, cold gas-dynamic spraying is performed at a temperature that is well below the melting point for the powdered material being sprayed. Instead, a coating is formed by the impact and kinetic energy of the powder particles, which in turn cause the particles to undergo high-speed plastic deformation and to bond to the surface on which the particles are sprayed. Again, prior to the present invention, James and other cold spraying publications represented the general understanding that the cold gas-dynamic spraying process would not require the post-spray thermal treatments associated with contemporary thermal spraying or coating processes.

Arnold, considered alone or in view of James, fails to introduce post-spray thermal treatments to cold gas-dynamic spraying processes. Rather, Arnold simply establishes the prior understanding that such thermal treatments are necessary after thermal coating or spraying processes. Although Arnold discloses vacuum sintering (col. 16, lines 62 to 65) and hot isostatic pressing (col. 20, lines 28 to 37), these steps follow a thermal coating process called hyper velocity oxyfuel (HVOF) plasma thermal spraying. In a typical HVOF thermal spraying process described by Arnold, a fuel gas and oxygen are used to create a combustion flame at 2500 to 3100 °C at a very high chamber pressure, and a supersonic gas stream forces the coating material through a small-diameter barrel at very high particle velocities. In contrast, a cold gas-dynamic spraying system typically uses inert gas at temperatures of up to 750 degrees F (current

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specification, paragraph 0036). It is therefore clear that Arnold fails to provide any teaching or suggestion to a person of ordinary skill in the art of cold gas-dynamic spraying that post-spray thermal treatments should follow a cold gas-dynamic spraying process. For at least these reasons, it is respectfully requested that the rejections of claim 1, and all claims depending from claim 1, should be withdrawn.

ii) Claim 13

Claim 13 further defines post-spray thermal treatments to include 1) vacuum sintering the high pressure turbine component after the cold gas-dynamic spraying step; 2) performing a hot isostatic pressing on the high pressure turbine component after the vacuum sintering step; and 3) heat treating the high pressure turbine component after performing the hot isostatic pressing step. In addition to the previously-discussed reasons that James and Arnold fail to render post-cold gas-dynamic spray thermal treatments obvious, it is also respectfully submitted that Arnold fails to teach or suggest performing a heat treatment after performing vacuum sintering and hot isostatic pressing steps. The examiner briefly addresses the heat treatment step on page 7, second paragraph of the office action. However, the examiner merely states that the heat treatment can be wrapped into the vacuum sintering or hot isostatic pressing steps since they can be performed at high temperatures. For this reason, claim 13 is amended to further clarify that the heat treatment is performed after the vacuum sintering and hot isostatic pressing. Since neither James nor Arnold teach or suggest this sequence of steps, it is respectfully requested that the rejections of claims 13 be withdrawn, along with the rejections of all claims depending from claim 13.

F. Conclusion

In view of Applicant's amendments and remarks, it is respectfully submitted that Examiner's objections and rejections have been overcome. Accordingly, Applicants respectfully submit that the application is now in condition for allowance, and such allowance is therefore earnestly requested. Should the Examiner have any questions or wish to further discuss this

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application, Applicants request that the Examiner contact the Applicants attorneys at the below-listed telephone number.

If for some reason Applicants have not requested a sufficient extension and/or have not paid a sufficient fee for this response and/or for the extension necessary to prevent abandonment on this application, please consider this as a request for an extension for the required time period and/or authorization to charge Deposit Account No. 50-2091 for any fee which may be due.

Respectfully submitted,

INGRASSIA FISHER & LORENZ

Dated: Sep 16, 2004

By: 

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